

NRC FORM 313
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34, 35, 36, 39, and 40

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0120

EXPIRES: 10/31/2008

Estimated burden per response to comply with this mandatory collection request: 4.4 hours. Submittal of the application is necessary to determine that the applicant is qualified and that adequate procedures exist to protect the public health and safety. Send comments regarding burden estimate to the Records and FOIA/Privacy Services Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0120), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

APPLICATION FOR MATERIAL LICENSE

INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:

DIVISION OF INDUSTRIAL AND MEDICAL NUCLEAR SAFETY
OFFICE OF NUCLEAR MATERIALS SAFETY AND SAFEGUARDS
U.S. NUCLEAR REGULATORY COMMISSION
WASHINGTON, DC 20555-0001

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS:

IF YOU ARE LOCATED IN:

ALABAMA, CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, FLORIDA, GEORGIA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, MISSISSIPPI, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, NORTH CAROLINA, PENNSYLVANIA, PUERTO RICO, RHODE ISLAND, SOUTH CAROLINA, TENNESSEE, VERMONT, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

LICENSING ASSISTANCE TEAM
DIVISION OF NUCLEAR MATERIALS SAFETY
U.S. NUCLEAR REGULATORY COMMISSION, REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406-1415

IF YOU ARE LOCATED IN:

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:

MATERIALS LICENSING BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, IL 60532-4352

ALASKA, ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEVADA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, OREGON, PACIFIC TRUST TERRITORIES, SOUTH DAKOTA, TEXAS, UTAH, WASHINGTON, OR WYOMING, SEND APPLICATIONS TO:

NUCLEAR MATERIALS LICENSING BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TX 76011-4005

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTIONS.

1. THIS IS AN APPLICATION FOR (Check appropriate item)



A. NEW LICENSE



B. AMENDMENT TO LICENSE NUMBER



C. RENEWAL OF LICENSE NUMBER

2. NAME AND MAILING ADDRESS OF APPLICANT (Include ZIP code)

Southeastern Pennsylvania Transportation Authority (SEPTA)
Transit Police Department
200 West Wyoming Avenue
Philadelphia, PA 19107

3. ADDRESS WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED

The licensed material will be stored, used, and dispatched at the above address. Authorization is also requested for licensed material to be used in temporary job-site locations anywhere in the United States where NRC maintains jurisdiction (wherever bomb detection services are needed).

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Raymond H. Johnson, MS, PE, FHPS, CHP

TELEPHONE NUMBER

(301) 990-6006

SUBMIT ITEMS 5 THROUGH 11 ON 8-1/2 X 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL

a. Element and mass number; b. chemical and/or physical form; and c. maximum amount which will be possessed at any one time.

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING EXPERIENCE.

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.

9. FACILITIES AND EQUIPMENT.

10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT.

12. LICENSE FEES (See 10 CFR 170 and Section 170.31)

FEE CATEGORY

AMOUNT
ENCLOSED \$

13. CERTIFICATION. (Must be completed by applicant) THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, 36, 39, AND 40, AND THAT ALL INFORMATION CONTAINED HEREIN IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

CERTIFYING OFFICER - TYPED/PRINTED NAME AND TITLE

James Metzger

SIGNATURE

DATE

11/21/06

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	AMOUNT RECEIVED	CHECK NUMBER	COMMENTS
			\$		
APPROVED BY				DATE	

Note: This license application has been prepared according to guidance found in NUREG 1556, Vol. 1, Consolidated Guidance about Materials Licenses. Program-Specific Guidance about Portable Gauge Licenses, November 2001.

Item 1 – This is an application for a New License

Item 2 – Name and Mailing Address of Applicant

Southeastern Pennsylvania Transportation Authority (SEPTA)
Transit Police Department
200 West Wyoming Avenue
Philadelphia, PA 19107

Item 3 –Address Where Licensed Material will be Used

The licensed material will be stored, used, and dispatched at the above address. Authorization is also requested for licensed material to be used in temporary job-site locations anywhere in the United States where NRC maintains jurisdiction (wherever bomb detection services are needed).

Item 4 – Name of Person to be Contacted about this Application

Raymond H. Johnson, MS, PE, FHPS, CHP
Director, Radiation Safety Academy
481 North Frederick Avenue, Suite 302
Gaithersburg, MD 20877
301-990-6006
rjohnson@radtrain.com

Item 5 - Radioactive Material:

- A. Nuclide
- B. Chemical and/or physical form
- C. Possession limit

3A	3B	3C
A. Hydrogen-3	Solid Sealed Sources (HiEnergy Technologies, Inc. SIEGMA 3E3 or 3M3 Sealed Source Detectors, CA 1259D101S	3 sources Not to exceed 6 Ci

Item 6 - Purposes for Which Licensed Material will be Used.

Radioactive material will be possessed, used, and stored in portable sealed source gauges (SIEGMA 3E3 or 3M3) for detection of explosive materials by measurement of neutron activation products created in potentially explosive materials. These gauges are registered in California as Sealed Source Device number CA1259D101S. These portable gauges will only be used for the purposes described in the SSD Registration.

The SIEGMA 3E3 or 3M3 gauges consist of a licensed tritium-containing neutron generator tube (hermetically sealed in an aluminum cylinder), a power supply, a Germanium gamma ray detector, a liquid nitrogen Dewar (or electronic cooling device), and associated electronics in one or more aluminum carrying cases. The gauges are controlled remotely with a fiber optic cable connected to a laptop personal computer.

Item 7 - Individual Responsible for the Radiation Safety Program and Their Training and Experience

Radiation Safety Officer: Patrick Smythe

Patrick Smythe has the following training relevant to serving as RSO for a SEPTA portable gauge license.

- 2003- University of Nevada, Las Vegas, Radiological/Nuclear Course for Hazardous Material Technicians
- 2004- Pennsylvania Emergency Management Agency, Radiological Response Team
- 2004- Pennsylvania State Fire Academy, Radiological Response Team Comprehensive
- 2005- Nevada Technical Associates Inc., Radiation Safety Officer 40 hour class
- 2005- HiEnergy Technologies, Inc, Fundamentals of Radiation Safety for SIEGMA 3E3 Operators – 6 hours
- 2005- HiEnergy Technologies, Inc, DOT Requirements for Shipping and Receiving SIEGMA 3E3 – 3 hours
- 2006 - HiEnergy Technologies, Inc, supervised hands-on training for SIEGMA Operators – more than three days over the past year.

The RSO and Alternate both have the same training and experience including a 40-hour Radiation Safety Officer course and nine hours of radiation safety training provided by the gauge manufacturer on November 29, 2005. This class consisted of:

Radiation Safety Awareness (one hour)

Introduction and Exploring Views on Radiation
Understanding Sources of Radiation Around Us Every Day
A Brief Review of the HiEnergy Technologies, Inc. SIEGMA 3E3 Bomb
Detecting Device and Potential for Radiation Exposure
Summary and Answer Questions

Fundamentals of Radiation Safety for Operators of SIEGMA 3E3 (five hours)

What is Radiation and Radioactivity?
What are the Health Effects of Radiation?
A Review of Radiation Detection Instruments (available to SEPTA)

Nuclear Regulatory Commission Requirements for Radiation Safety
SEPTA Radiation Safety Program Requirements
Hands-on Inspection and Dose Rate Measurements
of SIEGMA 3E3 Bomb Detectors
Summary and Answer Questions

DOT Requirements for Transporting SIEGMA 3E3 (three hours)

Training Requirements for Transporting SIEGMA 3E3
Awareness, Familiarization with Labels, Function Specific, Safety,
and Security Requirements
Review and Preparation for Exam
Multiple Choice Exam (passing grade 70% required)
Review Exam and Answer Questions

This radiation safety training was presented by HiEnergy Technologies, Inc (the portable gauge manufacturer). The instructor was Raymond H. Johnson, MS, PE, FHPS, CHP, Director of the Radiation Safety Academy, Gaithersburg, MD. Mr. Johnson is a 40 year career specialist in radiation safety who has provided 40-hour training to qualify over 1900 people to serve as RSOs over the past 15 years. Mr. Johnson has more than 10 years of experience with portable and fixed nuclear gauges, including gauge license and sealed source device registration applications, annual radiation safety program audits for both gauge manufacturers and gauge users, conducting training on gauge operations and safety, and professional radiation safety consultation to gauge manufacturers and users. Mr. Johnson also has a day of hands-on training on the SIEGMA 3E3 bomb detector gauge at the manufacturing facility of HiEnergy Technologies, Inc. in California. Mr. Johnson also wrote the HiEnergy Technologies, Inc. license application for manufacturing and distribution and the application for the SSDR for SIEGMA 3E3 and 3M3 detector gauges.

In addition to the radiation safety training described above, the RSO and Alternate have also received more than three days of hands-on training over the past year to learn how to operate the SIEGMA 3E3 bomb detector. This training was provided by Authorized Users from HiEnergy Technologies, Inc. who are very knowledgeable experts on the electronics, design, operation, and troubleshooting of the SIEGMA 3E3 bomb detectors.

The training described above was done prior to issuance of the SSDR for the SIEMA gauges. The SSDR issued on September 29, 2006 requires three days of training, to include both radiation safety and hands-on operation of the bomb detectors. Although, more than three days of training have already been provided, given that nearly a year has passed since the initial training, the manufacturer commits to another day of refresher training prior to issuance of the license.

Alternate Radiation Safety Officer: Nicholas Natale

Authorized Users: Radioactive material shall be used by, or under the supervision of, the following individuals:

Oscar Burton
John Gerretz
Stephen Harold
Evan Horn
Daryl Jones
Christopher Lafferty
Kenneth Lanning
Charles Lawson
Kevin Mahoney
James Metzger
Don Noz
Edward Reynolds III
James Reynolds
Loyd Rodgers
Anthony White
James Zuggi

Item 8 - Training for Individuals Working in or Frequenting Restricted Areas

Each Authorized User has received the same manufacturer's training in radiation safety and hands-on training for operating the SIEGMA 3E3 bomb detectors as described for the RSO and Alternate above. Because a year has passed since the initial training, the manufacturer will provide another day of radiation safety refresher training before SEPTA takes possession of a SIEGMA system.

Refresher training will be provided annually. Training programs are described in **Attachment 3, Radiation Safety Manual**.

Item 9 – Facilities and Equipment (See Attachment 2)

A Facility Diagram, specifically the storage room for receiving, storage, assembly, maintenance, testing, and shipping of the SIEGMA 3E3 and 3M3 gauges is included as **Attachment 2**. The storage room is located in part of a large office building serving as the police station, offices, training, and maintenance facility for SEPTA. The storage room is posted "Caution Radioactive Materials" as a restricted area (along with a Notice to Employees, emergency response phone numbers, and a Notice of Availability for the Radiation Safety Program, Operating and Emergency Procedures, and Regulations). Adjacent areas to the storage room include a public hallway and offices. These areas will

be monitored with dosimetry badges to assure that no one exceeds the public exposure limits.

Since these bomb detectors are based upon a solid sealed tritium source in multiple layers of housings, there is no measurable radiation signal outside the units until they are energized. Thus, they can be handled and stored without any shielding requirements. After use, the neutron generators may have some residual activity from neutron activation products. However, these activation products are very low energy gamma emitters and also have a half-life of only seconds to minutes. Thus, there should be very little residual activity remaining after a few minutes at the end of a test.

Security

The bomb detectors, as received from HiEnergy Technologies, Inc. will be stored in a locked and posted room as shown on the **Facility Diagram (Attachment 2)**. The bomb detectors will be locked in a storage case within the locked storage room. The storage room is located in a locked and secured police station.

Use at Temporary Locations

The SIEGMA 3E3 and 3M3 bomb detectors are portable nuclear gauges not intended for use in any fixed locations or with any provisions for shielding. They are intended for use by law enforcement personnel or first responders to identify bombs in unshielded field locations, such as bus, train, and airline terminals. Thus, they will also be used, tested, and demonstrated (for training purposes) in such locations.

Restricted Areas

When the bomb detectors are in use at temporary locations, a restricted area will be established by the trained and licensed device operators (Authorized Users) at a distance of about 30 feet from the operating bomb detectors (a 20 feet limit is more than adequate for public protection at 2 mR in an hour, and 30 feet is very conservative for ALARA). This may be done by setting up a physical barrier, such as a roped perimeter. Alternatively, for example, if time does not allow because of the urgency of inspecting a potential bomb package, the trained and licensed device operator will maintain visual observation of an area within 30 feet and will give verbal warnings to prevent anyone from approaching the operating detectors. The SSDR requires two trained operators present for use of the SIEGMA system. While one is operating the system the second operator will observe the area for security and also make neutron and gamma dose rate measurements.

Note: exclusion area restrictions around a potential bomb package will normally be much greater than 30 feet for explosives protection. For example, 300 feet or more

would be normal for a small potentially explosive package (suitcase size). Greater distances would be used for larger packages (vehicle size.)

The SIEGMA 3E3 and 3M3 gauges also include a red warning light that is visible from all directions. This light is activated whenever the neutron generator is energized. When the bomb detector is in operation, a sign will be also posted adjacent to the detector (aluminum carry case) warning "Caution High Radiation Area." Another sign warning "Caution High Radiation Area" will be posted conspicuously at the boundary of the controlled area.

Storage at any temporary-use-location will include locking the carrying case for the SIEGMA 3E3 or 3M3, and storing the carrying case in a locked storage room (posted "Caution Radioactive Materials") within a locked building. These gauges will be transported in accordance with DOT requirements.

Item 10 - Radiation Safety Program (See Attachment 3)

SEPTA will maintain a radiation safety program as outlined in NUREG – 1556, Vol. 1, Consolidated Guidance about Materials Licenses. Program-Specific Guidance about Portable Gauge Licenses, November 2001.

A. Audit Program

As a part of the safety program, SEPTA will review the content and implementation of its radiation safety program annually to ensure:

- 1) compliance with NRC and DOT regulations and the terms and conditions of the license,
- 2) occupational doses and doses to members of the public are ALARA,
- 3) satisfactory job performance by the RSO and AUs,
- 4) operating procedures are in place for activities which could potentially affect radioactive material or occupational dose, and
- 5) records of audits and other reviews of program content are maintained for 3 years.

Audits will be conducted annually (at intervals not to exceed 12 months) according to the Audit Outline in *Appendix F, NUREG – 1556, Vol. 1, 'Consolidated Guidance about Materials Licenses. Program-Specific Guidance about Portable Gauge Licenses, November 2001.*

Audits will be conducted by the RSO, the Alternate RSO, or a qualified independent third party consultant (such as Certified Health Physicist staff of the Radiation Safety Academy).

B. Radiation Detection Instruments

SEPTA will use instruments that meet the radiation monitoring instrument specifications published in *Appendix K to NUREG-1556, Vol. 1*. In particular, SEPTA will have available gamma and neutron exposure monitoring instruments. SEPTA reserves the right to upgrade survey instruments as necessary.

The Southeastern Pennsylvania Transportation Authority (SEPTA) will employ two types of radiation dose rate instruments, a gamma exposure meter and a neutron exposure meter. In particular, SEPTA will use the "microRem" model manufactured by Thermo Electron Corporation.¹ This is a plastic scintillator with an energy independent response over a wide energy range. The neutron survey instrument will be the "Meridian 5085" model manufactured by Far West Technologies.² This is a "rem ball" type instrument. Both of these types of instruments will be used:

- 1) to verify the combined gamma and neutron exposure levels at the operator's location remotely from the bomb detectors,
- 2) to determine where to set a restricted area when the bomb detectors are in use at temporary job sites, and
- 3) to determine the presence of neutron activation products after use of the bomb detectors.

One or more of each of these radiation detection instruments will be maintained for use at the source storage location. One of each type of dose rate instrument will also be sent with the bomb detectors for use at off-site locations.

Note: These instruments would not be used to verify integrity of the sources resulting from an incident. Since these gauges use a solid sealed source of tritium, if the hermetically sealed neutron generator tube is breached in any manner, at most only 2 mCi of gaseous tritium would be released to the air, according to the SSDR. Such releases would not be measurable by portable field instruments (see the section on Emergency Response in the Radiation Safety Manual). If there is any evidence of physical damage to the neutron generators, the manufacturer (HiEnergy Technologies, Inc.) will be called for appropriate handling.

Exposure instrument calibrations will be done at intervals not to exceed 12 months by an Agreement State or NRC licensee specifically authorized to perform instrument

¹ The "microRem" model x-ray/gamma-ray tissue-equivalent survey monitor was formerly known as the Bicon-St. Gobain microRem (or microSievert) model. The Radiation Measurement division of Bicon-St. Gobain is now a part of Thermo Electron Corporation.

² More information and an operator's manual for the Meridian 5085 can be found at:
http://www.fwt.com/hpi/hpi_5085ds.htm

calibrations. Currently, calibrations are done by Health Physics Instruments, 330 D South Kellog Ave., Goleta, CA.

C. Material Receipt and Accountability

SEPTA will maintain comprehensive records of all receipt and transfer of licensed material to ensure cradle to grave accountability. Licensed materials will be maintained in a secure area, i.e., the source storage area will be either locked or occupied at all times. Physical inventories will be conducted at intervals not to exceed six months to account for all licensed sources received and possessed under the license. Inventory records will ensure that the possession limit stated in the license is not exceeded.

Six-Month Inventory records will include:

- 1). Radionuclide and amount (in units of becquerels or curies) of byproduct material in each sealed source;
- 2). Make, Model, and Serial Numbers of all licensed sources.
- 3). Date of receipt
- 4). Location of licensed sources.
- 5). Date of transfer
- 6). Activity possessed under the license.
- 7). Date of the inventory.
- 8). RSO Signature.

D. Occupational Dose

Authorized Users will be monitored in accordance with the criteria in the section entitled ***'Radiation Safety Program – Occupational Dose' in NUREG-1556, Vol. 1, 'Consolidated Guidance about Materials Licenses: Program-Specific Guidance about Portable Gauge Licenses, November 2001.*** Appropriate personnel dosimeters (e.g., TLDs with neutron detection capabilities) will be procured from a National Voluntary Laboratory Accreditation Program (NVLAP) approved dosimetry service. They will be furnished to the RSO and other Authorized Users who work with licensed materials and will be exchanged quarterly. Quarterly exchange of dosimeters should be adequate based on several years of manufacturer's experience showing that bomb detector operators typically receive zero dose or at most only a few mrem a month. SEPTA is currently using dosimetry badges provide by Global Dosimetry Solutions, Inc. of Irvine, CA.

If internal exposure to any licensed material is suspected because of fire or other incident that could result in the release of tritium, then urine bioassay samples will be collected. Estimates of committed effective dose equivalent (CEDE) will be based on urinalysis data.

E. Public Dose

SEPTA will ensure that licensed gauges will be used, transported, and stored in such a way that members of the public will not receive more than 1 millisievert (1 mSv) [100 millirem (100 mrem)] in one year, and the dose in any unrestricted area will not exceed 0.02 millisievert (mSv) [2 mrem (millirem)] in any one hour, from licensed operations. SEPTA will control and maintain constant surveillance over gauges that are not in storage and secure stored gauges from unauthorized removal or use.

Monitoring of Public Areas Adjacent to Storage Rooms. Area dosimeters or monitors (e.g., TLDs with neutron detection capabilities) procured from a National Voluntary Laboratory Accreditation Program (NVLAP) approved dosimetry service will be used to document compliance with public dose limits in areas surrounding the posted storage room.

The same badges used for personnel dosimetry will be used as area monitors in the vicinity of the stored sources. These badges will be used to verify that public exposure limits are not exceeded outside of the restricted storage area **(as noted on a diagram of the Facility shown in Attachment 2)**.

Since the SIEGMA bomb detector gauges contain only solid sealed sources of tritium, no measurable signal is expected even in contact with the gauge carrying cases. Although some residual gamma activity may occur immediately after operation of the neutron generators, this has been found to have a very short half life of a few minutes. Thus, by the time the gauges are returned to the storage room, there should be little if any remaining gamma activity. Several years of records at the manufacturing facility have shown that doses to members of the public are compliant with the appropriate dose limits. A radiation safety program audit of HiEnergy Technologies, Inc.'s facility conducted in February 2006 indicated that all of the area monitoring badges (for evaluating doses in unrestricted areas) had readings showing zero monthly exposures above normal background for several years.

Monitoring at Temporary Use Locations. While the bomb detectors are in use for evaluating a potential bomb package, public access will be restricted to within 30 feet of the operating gauge. Measurements of combined gamma and neutron dose rates show that the public dose limit of 2 mR in an hour can be met at 20 feet from the operating gauge, however, the manufacturer recommends a 30 foot radius restriction for ALARA. The perimeter of the restricted area will also be monitored by an Authorized User with portable gamma and neutron detectors, as described above.

F. Operating and Emergency Procedures

Operating and emergency procedures will be developed, implemented, and maintained, and will meet the criteria in the section entitled '*Radiation Safety Program –Operating and Emergency Procedures*' in *NUREG-1556, Vol. 1, Rev. 1, 'Consolidated Guidance about Materials Licenses: Program-Specific Guidance about Portable Gauge Licenses,' dated November 2001* and provide copies of these procedures to all gauge users and at each job site.

Operating and emergency procedures have been developed and are included in the **Radiation Safety Manual (Attachment 3)**. Procedures will be revised only if:

- 1) the changes are reviewed and approved by the licensee management and the RSO in writing;
- 2) the licensee staff is provided training in the revised procedures prior to implementation;
- 3) the changes are in compliance with the NRC regulations and the radioactive materials license; and
- 4) the changes do not degrade the effectiveness of the radiation safety program.

G. Leak Tests

The tritium sources possessed by SEPTA are exempt from leak test requirements according to the SSDR issued by California to HiEnergy Technologies, Inc. (CA1259D101S). Since the tritium is in the form of a solid sealed source within multiple housings, there should never be any measurable tritium on the outside of a neutron generator unless the generator housing is severely breached by fire or explosion.

H. Maintenance

Sources and gauges will be maintained in accordance with the requirements of the California Sealed Source and Device Registration certificate (CA1259D101S) and in compliance with ALARA principles. Since the neutron generators are supplied by HiEnergy Technologies, Inc. in a sealed heavy-walled aluminum cylinder, there is no source maintenance that can be done by SEPTA. Access within the aluminum cylinders is secured by special bolts requiring a special tool only available to the neutron generator manufacturer (Thermo MF Physics). If a neutron generator is not performing properly, the only recourse is to return the entire unit to Thermo MF Physics for servicing. Such troubleshooting and maintenance services will only be performed by Authorized Users from HiEnergy Technologies, Inc. The CA SSDR specifies that end users of the bomb detectors will not be authorized to perform any maintenance, other than refilling the liquid nitrogen Dewars for cooling the germanium detectors.

I. Transportation

Packaging of licensed sources and gauges for transport to a temporary use location will be done by trained persons in accordance with U.S. Department of Transportation (DOT) and NRC regulations. Shipping of the neutron generators can be done under a UN 2911 designation without requiring special packaging. SEPTA will only transport the SIEGA gauges within the aluminum carrying cases as provided by HiEnergy Technologies, Inc.

However, for shipment of the bomb detectors from HiEnergy Technologies, Inc. to SEPTA, the neutron generators will be removed from the aluminum carrying cases (designated as the SIEGMA 3E3 or 3M3) by a HiEnergy Technologies, Inc. Authorized User for shipment separately in the special heavy plastic boxes with form fitted packing as supplied by Thermo MF Physics, Inc to HiEnergy Technologies, Inc. After arrival of a gauge at SEPTA, an Authorized User from HiEnergy Technologies, Inc. will re-install the neutron generator into the bomb detector and verify satisfactory performance.

Item 11 - Waste Management

Not Applicable. Activities conducted under the license will not generate any radioactive waste streams. When no longer operational or needed, the SIEGMA 3E3 bomb detectors with their sealed sources will be returned to the manufacturer, HiEnergy Technologies, Inc.

Item 13 - Decommissioning and Decontamination Plans

Given the absence of any potential for contamination or generation of radioactive waste, the SIEGMA devices will not likely result in any residual radioactivity remaining in the device storage room for decommissioning. However, a final status survey will be conducted to assure that no radioactive material remains prior to release of the storage room for unrestricted use.

Item 14 - Certificate

The applicant and any official executing this certificate on behalf of the applicant named in item 1 certify that all information contained herein, including any supplements attached hereto, is true and correct. The individual executing this certificate has authority to commit the applicant relative to matters involved in this application.

Date

By: _____

Attachment 1

Resumes for the RSO and Alternate RSO

Patrick M. Smythe – RSO

Nicholas Natale – Alternate RSO

Phone [REDACTED]
E-mail [REDACTED]

Patrick M. Smythe

Functional summary

I have been a police officer for 23 years. As a member of the SEPTA Transit Police Department, My current assignment is to the Special Operations Response Team (SORT). I am certified as a Hazmat Technician/ Operator in Chemical, Biological, Explosive, Radiological, and Nuclear weapons with hands on experience with various military grade chemical weapons as well as radiological sources.

I am the Radiation Safety officer for SORT (SEPTA). I have been working under the supervision of HiEnergy Technologies licensed personnel since December 2005 with the SIEGMA system. I have taken the following training relevant to my role as RSO:

- 2003-National Nuclear Security Administration, Radiological/Nuclear Course for Hazardous Material Technicians
- 2003- University of Nevada, Las Vegas, Radiological/Nuclear Course for Hazardous Material Technicians
- 2004- Pennsylvania Emergency Management Agency, Radiological Response Team
- 2004- Pennsylvania State Fire Academy, Radiological Response Team Comprehensive
- 2005-Nevada Technical Associates Inc., Radiation Safety Officer, 40 hours
- 2005- HiEnergy Technologies, Inc., Fundamentals of Radiation Safety for SIEGMA 3E3 Operators – six hours
- 2005- HIEnergy Technologies, Inc, DOT Requirements for Shipping and Receiving SIEGMA 3E3 – three hours
- 2006- HIEnergy Technologies, Inc., Supervised hands-on SIEGMA operators training, more than three days over the past year.

Along with the afore mentioned training, I am trained as a Fire Fighter and Emergency Medical Technician with over 25 years experience, receiving 6 Valor awards for saving lives from fire.

Employment

1988 - Present
Transit Police

South Eastern Pennsylvania Transit Authority
Philadelphia, Penna.

Police Officer

2002-Present

Currently assigned to the Special Operations Response Team. Primary duties include counter terrorism in mass transit, specializing in weapons of mass destruction. To include but not limited to Chemical, Biological, Explosive, Radiological, and Nuclear.

**PERSONAL INFORMATION WAS REMOVED
BY NRC. NO COPY OF THIS INFORMATION
WAS RETAINED BY THE NRC.**

1994-2002

Assigned to the Criminal Investigation Section. Primary duties included investigation, arrest and prosecution of serious crimes on buses through plain-clothes surveillance and investigation.

1988-1994

Assigned to the Uniformed patrol Division. Duties included protecting lives and property on and around all SEPTA Property, through enforcement of State and local crimes code and ordinances.

I have received 15 commendations for outstanding Police work.

**Summary of
qualifications**

- 1979 –Delaware County Fire Academy, Basic Fire Fighting
- 1981- Delaware County Fire Academy, Advance Fire Fighting
- 1983- Delaware County Police Academy
- 1988- Philadelphia Police Academy
- 1997- Federal Transit Authority. Transit Explosives Management
- 2002- Department of Justice. WMD Technical Emergency Response
- 2002- Auburn university, WMD Technical Emergency Response Training
- 2002-Commonwealth of Pennsylvania, Terrorism Awareness and Prevention
- 2003-United States Marine Corps 4th MEB, Chemical Biological Incident Response Force.
- 2003-National Nuclear Security Administration, Radiological/Nuclear Course for Hazardous Material Technicians
- 2003- University of Nevada, Las Vegas, Radiological/Nuclear Course for Hazardous Material Technicians
- 2004- New Mexico Tech, Incident Response to Terrorist Bombings
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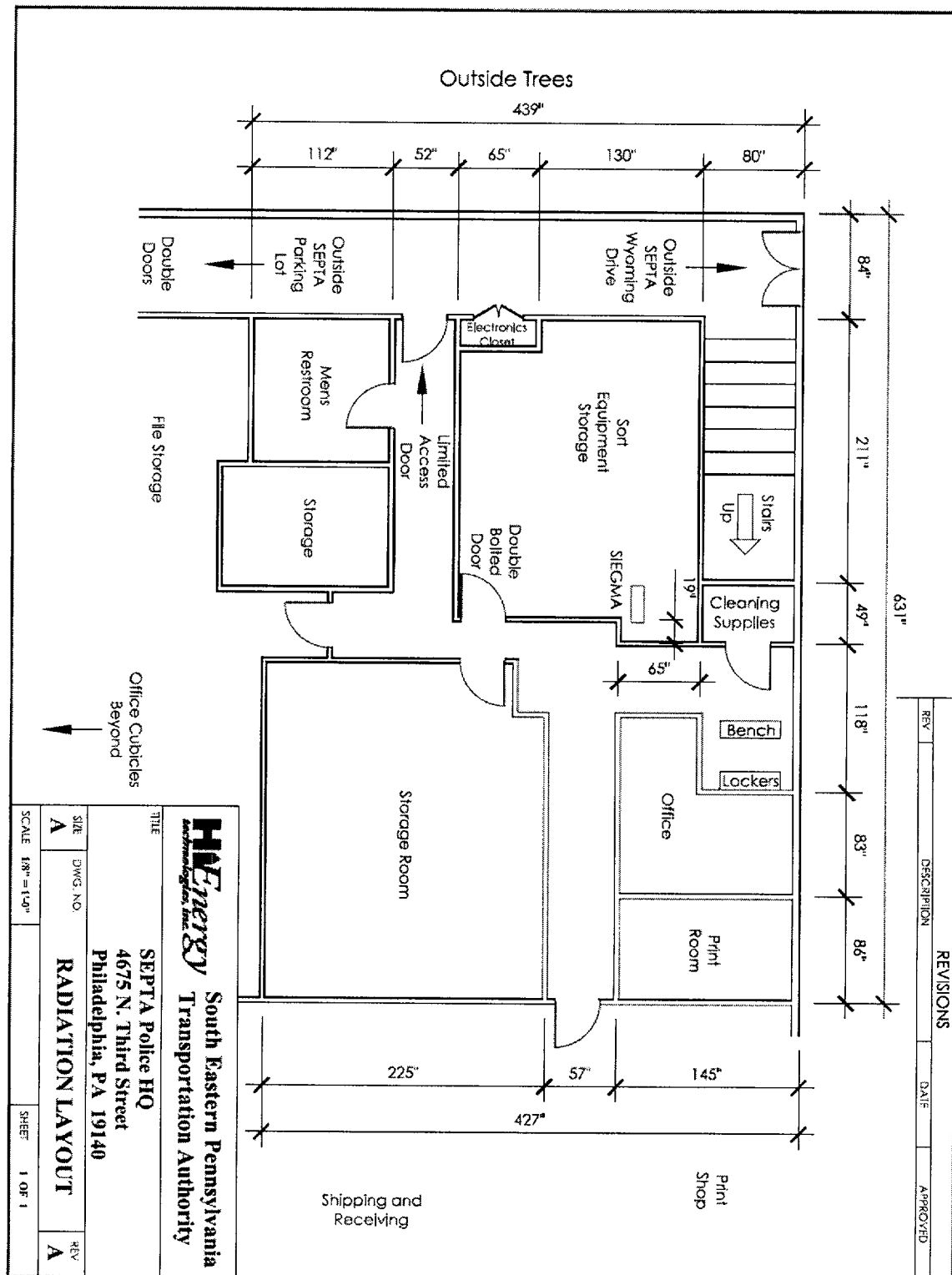
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Receiving SIEGMA 3E3 – three hours

- 2006- HIEnergy Technologies, Inc., Supervised hands-on SIEGMA operators training, more than three days.
- 2006- Smiths Detection, Haz-Mat ID
- 2006- Smiths Detection, Sabre 4000

Attachment 2

Facility Diagram



Attachment 3

Southeastern Pennsylvania Transportation Authority (SEPTA)

Radiation Safety Manual

**Southeastern Pennsylvania Transportation Authority (SEPTA)
Philadelphia, PA**

RADIATION SAFETY MANUAL

**Southeastern Pennsylvania
Transportation Authority
(SEPTA)**

Philadelphia, PA

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PREFACE

This **Radiation Safety Manual** was prepared and approved by the SEPTA Radiation Safety Officer with the assistance of the Radiation Safety Academy, Inc., Gaithersburg, Maryland. This manual was prepared according to guidance given in *NUREG 1556, Vol. 1, Rev. 1, Consolidated Guidance about Materials Licenses. Program-Specific Guidance about Portable Nuclear Gauges, November 2001*.

Applicable regulations for the Nuclear Regulatory Commission and DOT are incorporated into this manual. This document is to serve as a reference for good radiation safety practices. Users of licensed radioactive material must also have technical knowledge of radiation safety and experience in handling radioactive materials. The best way to achieve this knowledge and experience is through training, on the job experience, and asking questions.

The safety requirements and operating procedures described in this radiation safety manual form the radiation safety program for SEPTA. The Radiation Safety Officer will provide users of licensed radioactive materials with a copy of this manual and training as described herein and required by license condition.

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ABBREVIATIONS USED IN THE MANUAL

ALARA	-	As Low As Reasonably Achievable
ARSO	-	Assistant or Alternate Radiation Safety Officer
AU	-	authorized user
Bq	-	Becquerel
Ci	-	Curie
cm ²	-	square centimeters
cpm	-	counts per minute
dpm	-	disintegrations per minute
GM	-	Geiger-Muller
mCi	-	milliCurie
MeV	-	mega electron-Volt
mrem	-	millirem (0.001 rem)
NRC	-	Nuclear Regulatory Commission
Rad	-	Radiation Absorbed Dose
RSO	-	Radiation Safety Officer
R	-	Roentgen
SSDR	-	Sealed Source Device Registration
Sv	-	Sievert
TLD	-	thermoluminescent dosimeter
³ H	-	tritium (hydrogen-3)

GLOSSARY OF TERMS

Absorbed dose means the energy imparted by ionizing radiation per unit mass of irradiated material. The units of absorbed dose are the rad and the gray (Gy).

Activity is the rate of disintegration (transformation) or decay of radioactive material. The units of activity are the curie (Ci) and the becquerel (Bq).

ALARA (acronym for "As Low As is Reasonably Achievable") means making every reasonable effort to maintain exposures to radiation as far below the dose limits as is practical and consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of licensed materials in the public interest.

Background radiation means radiation from cosmic sources; naturally occurring radioactive materials in the ground, including radon, and global fallout as it exists in the environment from the testing of nuclear explosive devices or from past nuclear accidents, such as Chernobyl that contribute to background radiation and are not under the control of the licensee. "Background radiation" does not include radiation from source, byproduct, or special nuclear materials regulated by State and Federal agencies.

Controlled area means an area, outside of a restricted area but inside the site boundary, access to which can be limited by the licensee for any reason.

Declared pregnant woman means a woman who has voluntarily informed the licensee, in writing, of her pregnancy and the estimated date of conception. The declaration remains in effect until the declared pregnant woman withdraws the declaration in writing or is no longer pregnant.

Dose or radiation dose is a generic term that means absorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, committed effective dose equivalent, or total effective dose equivalent, as defined in other paragraphs of this document.

Dose equivalent means the product of the absorbed dose in tissue, quality factor, and all other necessary modifying factors at the location of interest. The units of dose equivalent are the rem and Sievert (Sv).

Dosimetry processor means an individual or organization that processes and evaluates individual monitoring equipment in order to determine the radiation dose delivered to the equipment.

Exposure means being exposed to ionizing radiation or to radioactive material. Exposure is measured as ionization in air in units of Roentgen (R).

External dose means that portion of the dose equivalent received from radiation sources outside the body.

Extremity means hand, elbow, arm below the elbow, foot, knee, or leg below the knee.

High radiation area means an area, accessible to individuals, in which radiation levels from radiation sources external to the body could result in an individual receiving a dose equivalent in excess of 100 mrem (1 mSv) in 1 hour at 30 centimeters from the radiation source or 30 centimeters from any surface that the radiation penetrates.

Lens dose equivalent (LDE) applies to the external exposure of the lens of the eye and is taken as the dose equivalent at a tissue depth of 0.3 centimeter (300 mg/cm²).

Licensed material means source material, special nuclear material, or byproduct material received, possessed, used, transferred or disposed of under a general or specific license issued by the Nuclear Regulatory Commission.

License means a radioactive materials license issued by the Nuclear Regulatory Commission.

Limits (dose limits) means the permissible upper bounds of radiation doses.

Member of the public means any individual except when that individual is receiving an occupational dose and are trained as a radiation worker.

Minor means an individual less than 18 years of age.

Occupational dose means the dose received by a trained radiation worker in the course of employment in which the individual's assigned duties involve exposure to radiation or to radioactive material from licensed and unlicensed sources of radiation, whether in the possession of the licensee or other person. Occupational dose does not include doses received from background radiation, from any medical administration the individual has received, from exposure to individuals administered radioactive material, from voluntary participation in medical research programs, or as a member of the public.

Public dose means the dose received by a member of the public (not trained as a radiation worker) from exposure to radiation or to radioactive material released by a licensee, or to any other source of radiation under the control of a licensee. Public dose does not include occupational dose or doses received from background radiation, from any medical administration the individual has received, from exposure to individuals administered radioactive material, or from voluntary participation in medical research programs.

rad – Radiation Absorbed Dose; unit of dose

Radiation (ionizing radiation) means alpha particles, beta particles, gamma rays, x-rays, neutrons, high-speed electrons, high-speed protons, and other particles capable of producing

ionization. Radiation, as used in this part, does not include non-ionizing radiation, such as radio- or microwaves, or visible, infrared, or ultraviolet light.

Radiation area means an area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 0.005 rem (0.05 mSv) in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates.

rem – unit of dose equivalent

Restricted area means an area, access to which is limited by the licensee for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive materials.

Sealed Source Device Registration – A certificate issued to the device manufacturer to show that the device has had a safety evaluation and determination that it may be sold or distributed for the purposes and conditions of use as specified.

Survey means an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation. When appropriate, such an evaluation includes a physical survey of the location of radioactive material and measurements or calculations of levels of radiation, or concentrations or quantities of radioactive material present.

Total Effective Dose Equivalent (TEDE) means the sum of the deep-dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures).

Unrestricted area means an area, access to which is neither limited nor controlled by the licensee.

Whole body means, for purposes of external exposure, head, trunk (including male gonads), arms above the elbow, or legs above the knee.

1 Scope of the Radiation Safety Program

This Radiation Safety Program is provided to protect staff, visitors, the public and the environment from the harmful effects of ionizing radiation and to comply with regulatory requirements of the Nuclear Regulatory Commission. The program extends to any and all activities related to use of licensed radioactive material by SEPTA regardless of the location of those activities, including temporary sites, cities, states, countries, or territories.

2 Audit Program

The content and implementation of this radiation safety program will be reviewed annually (at intervals not to exceed 12 months). Audits will be conducted according to the outline provided in *Appendix F, NUREG 1556, Vol. 1, Rev. 1, Consolidated Guidance about Materials Licenses. Program-Specific Guidance about Portable Nuclear Gauges, November 2001.*

3 Description of the Program and Participants

The radiation safety program is administered by the Radiation Safety Officer (RSO). The program is implemented at the functional level by Authorized Users (AUs), or trained radiation workers under the supervision of an AU. The radiation safety program has been established to ensure that SEPTA acts in compliance with its Radioactive Material License and with all Federal regulations pertaining to the safe use and handling of radioactive materials and radiation generating equipment. To facilitate these goals, SEPTA has established policies and procedures for employees and a training program to ensure that all employees are familiar with these procedures and to provide employees with appropriate information to understand and implement good practices for radiation safety.

3.1 The Radiation Safety Officer (RSO)

An RSO is required by the radioactive materials license issued to SEPTA by the Nuclear Regulatory Commission. The RSO is responsible for implementing the requirements of the radioactive materials license, radiation safety policies, and procedures established by this manual. The RSO also takes action as necessary in emergencies. The RSO is the primary contact with all regulatory agencies. The RSO maintains records as required for compliance purposes.

The qualifications and duties of the RSO are provided below.

(Summarized from Appendix E. NUREG 1556, Vol. 1. Rev. 1, *Consolidated Guidance about Materials Licenses. Program-Specific Guidance about Portable Nuclear Gauges, November 2001.*)

- The RSO has received at least 40 hours of formal training in radiation safety, including gauge manufacturer's training.
- The RSO manages the day-to-day operations of the Radiation Safety Program.
- The RSO will have the authority to stop licensed activities that are considered unsafe.
- Possession, use, storage, and maintenance of sources and gauges are consistent with the limitations in the license, the Sealed Source and Device Registration Certificate, the Radiation Safety Manual, and the manufacturer's recommendations and instructions;
- When necessary, personnel monitoring devices are used and exchanged at the proper intervals; records of the results of such monitoring are maintained;
- Portable nuclear gauges are properly secured;
- Proper authorities are notified in case of accident, damage to gauges, fire, or theft;
- Unusual occurrences involving the gauge (e.g., accident, damage) are investigated, cause(s) and appropriate corrective action are identified, and corrective action is taken;
- Licensed material is transported in accordance with all applicable DOT requirements;
- Licensed material is disposed of properly;
- Appropriate records are maintained;
- An up-to-date license is maintained and amendment and renewal requests are submitted in a timely manner;
- Up-to-date operating and emergency procedures are developed, maintained, distributed, and implemented;
- Non-routine operations are performed by the manufacturer, distributor, or other person specifically authorized by the NRC or an Agreement State;
- Documentation is maintained to demonstrate, by measurement or calculation, that the TEDE to the individual member of the public likely to receive the highest dose from the licensed operation does not exceed the annual limit in 10 CFR 20.1301;
- When the licensee identifies violations of regulations or license conditions or program weaknesses, corrective actions are developed, implemented, and documented;
- Posting of documents required by 10 CFR 19.11 (Parts 19 and 20, license documents, operating procedures, NRC Form 3, "Notice to Employees"), and 10 CFR 21.6 (Part 21, Section 206 of Energy Reorganization Act of 1974, procedures adopted pursuant to Part 21) or posting a notice indicating where these documents can be examined.
- Assures compliance with the regulations of the Nuclear Regulatory Commission and the requirements of the SEPTA license to procure, use, store, secure, and dispose of radioactive materials.
- Maintains an inventory of all radioactive sources possessed under the license.
- Distributes personnel monitoring equipment, monitors personnel radiation exposures, notifies individuals and their supervisors of radiation exposures approaching established limits, recommends remedial actions to implement ALARA practices.

- Develops, implements, and assures proper training for all personnel involved in any facet of operations involving radioactive materials.
- Assures that all SEPTA Authorized Users receive periodic review of important procedures, rules, and methods.
- Maintains records of procurement, area monitoring, personnel monitoring, accidents and incidents, inventories, and any other required documents.
- Oversees the storage of radioactive materials not in current use.
- Approves requests to purchase radioactive materials after assuring that the orders for radioactive materials do not exceed established limits under SEPTA's license.
- Responds to all emergencies involving radioactive materials and provides advice and assistance as required by the program.
- Interacts with the Nuclear Regulatory Commission on issues related to SEPTA licenses, license amendments, application renewals, and inspections.
- Assures that all facets of the radiation safety program are compliant with the "As Low As Reasonably Achievable" (ALARA) philosophy.
- Holds periodic meetings with, and provides reports to, SEPTA management.
- Performs periodic audits (at intervals not to exceed 12 months) of the radiation safety program content and implementation.
- Ensures that the results of audits, identification of deficiencies, and recommendations for changes are documented (and maintained for at least 3 years), and communicated to management and other personnel and ensures that prompt actions are taken to correct deficiencies.
- Assures that at least two Authorized Users (Gauge Operators) are present for operation of a SIEGMA detector (one to operate the unit while the other observes security of the restricted area and performs gamma and neutron measurements).
- Ensures that all incidents, accidents, and personnel exposures in excess of regulatory limits are investigated and reported to the Nuclear Regulatory Commission, if required, within the required time limits.
- Maintains an understanding of, and up-to-date copies of, Federal regulations, revised license procedures, and ensures that the license is amended whenever there are changes in licensed activities, responsible individuals, or information or commitments made to the Nuclear Regulatory Commission during the licensing process.

NOTE: The Assistant or Alternate Radiation Safety Officer (ARSO) will assist the Radiation Safety Officer with the duties listed above. In the event the RSO is unable to perform the duties outlined above, for any reason including illness, travel, or vacation, the ARSO will temporarily serve in that role until either the RSO is able to return to service or a new RSO is appointed and authorized by an amendment to the license.

3.2 Classification of Participants

In terms of the Radiation Safety Program, all persons entering the SEPTA premises may be classified into one of four distinct categories – visitor, non-trained worker, trained worker, and

Authorized User (AU). These categories are based upon the level of training and the rights and responsibilities of individuals. Descriptions of these four categories are presented below.

3.2.1 Visitors

A visitor is a guest at the SEPTA facilities who is not an employee of SEPTA. With respect to issues dealing with radiation safety, visitors may have access to any location within the facility. However, while within restricted areas, visitors must be escorted by an AU at all times. For dose limitation, visitors are considered members of the public.

3.2.2 Non-trained Workers

A non-trained worker is an employee of SEPTA or a third party individual working for SEPTA who has not received basic radiation safety training and has therefore not been approved by the RSO to work with licensed radioactive sources. With respect to issues dealing with radiation safety, non-trained workers may have access to any location within the facility. However, while within restricted areas, non-trained workers must be escorted by an AU at all times. For dose limitation, a non-trained worker will be considered the same as a member of the public.

3.2.3 Trained Workers

A trained worker is a guest or an employee of SEPTA or a third party individual working for SEPTA who may work with radioactive materials under the supervision of the RSO or an AU. For dose limitation, a trained worker will be allowed to receive occupational dose within the regulatory limits and good practices of ALARA. Trained workers will not be identified by name on the license. To become a trained worker, one must successfully complete three days of training as specified in the SSDR (CA 1259D101S). This training will include a two-day manufacturer's course on Basic Radiation Safety (BRS) and at least one-day of manufacturer's hands-on training for operation of SIEGMA bomb detectors. Annual refresher training in radiation safety and operations of the SIEGMA bomb detectors is required of all approved trained workers. Refresher training will include a review of one or more of the topics listed below.

A two-day Basic Radiation Safety (BRS) course, to be provided by the gauge manufacturer, will include the following topics:

- ***Radiation Safety Awareness to include:***
 - Exploring views on radiation
 - Understanding sources of radiation around us every day
 - A review of SEPTA nuclear gauges and potential for radiation exposures
 - Understanding ALARA practices and emergency response.
 - Summary and answer questions

Note: This class will also be offered to Ancillary Personnel, i.e. anyone who may work in the vicinity of the nuclear gauges, either in storage or in use, and who may have concerns or questions regarding their radiation safety.

- ***Fundamentals of Radiation Safety to include items listed in Appendix D, NUREG 1556, Vol. 1, Rev. 1, Consolidated Guidance about Materials Licenses. Program-Specific Guidance about Portable Nuclear Gauges, November 2001.***
 - What is radiation, radioactivity, and contamination?
 - Interactions of radiation with matter
 - Internal vs external exposure
 - What are the health effects of radiation?
 - A review of radiation detection instruments, surveys, and personnel dosimetry
 - Federal regulatory requirements for radiation safety, licensing, and inspections
 - Requirements of the SEPTA Radiation Safety Manual, the radioactive materials license issued by the Nuclear Regulatory Commission, and the license application.
 - Control and surveillance of nuclear gauges
 - Program audits, inventory, record keeping, postings, labeling
 - Need for complete and accurate information, Notice to Employees information, options for employee protection, and consequences of deliberate misconduct
 - Principles of ALARA (time, distance, and shielding)
 - Theory and operation of SIEGMA nuclear gauges (bomb detectors)
 - Safe operating and emergency procedures, handling and reporting of incidents
 - Routine maintenance, handling, and storage of nuclear gauges
 - Hands-on inspection, operation, and dose rate measurements of bomb detectors
 - A review of incidents.
 - Summary, review, and preparation for exam
 - A written examination (70% passing grade required)
 - Review exam and answer questions

DOT Requirements for Transporting SIEGMA 3E3 or 3M3, to include:

- Training requirements for transporting SIEGMA 3E3 or 3E3
- Awareness, familiarization with labels, function specific, safety, and security requirements
- Review and preparation for exam
- Multiple choice exam (passing grade 70% required)
- Review exam and correct answers.

One day of Hands-on Training to include:

- Basic principles and operations of the SIEGMA bomb detectors.

- Detailed review of the SIEGMA Operator's Manual
- Supervised hands-on operation of the SIEGMA bomb detector

The duties of trained workers are listed below.

- Complete three days of BRS and hands-on manufacturer's training.
- Wear issued radiation dosimeters at all times in restricted areas posted for radioactive materials, or when in the vicinity of operating nuclear gauges.
- Practice principles of ALARA using time, distance, and shielding to protect themselves from radiation exposure.
- Be familiar with the location(s) of radioactive sources.
- Report any observed radiation safety infractions, shortcomings, or failures to the RSO in a timely manner.

3.2.4 Authorized User

Authorized Users (AUs) may work with radioactive materials (bomb detectors) independently and have the authority to supervise trained workers. AUs are individuals who have received three days of manufacturer's training in basic radiation safety and hands-on operation of the SIEGMA bomb detectors and who have been named on the license issued by the Nuclear Regulatory Commission. AUs are responsible for the safe use of licensed materials and equipment, and compliance with regulatory requirements.

Each AU must be familiar with Nuclear Regulatory Commission *Rules and Regulations Pertaining to Radiation Control*, safe radiological procedures, and all related requirements of the SEPTA radiation safety program and radioactive materials license. AUs are expected to fully support the ALARA program.

The duties of AUs are listed below.

- Attend the two-day SEPTA Radiation Safety Training BRS course and the one-day hands-on training (described above) prior to beginning work with licensed bomb detectors. To qualify as an AU for SEPTA, a person must have their name listed on a specific license issued to SEPTA
- Read the SEPTA Radiation Safety Manual, the radioactive material license, and the SSDR, and be responsible for their contents as applicable to their duties.
- Receive necessary on-the-job training from the RSO as it relates to the duties of the job.
- Call emergency medical services or the fire department (both at 911) immediately for any fire, explosion, or major accident and tell the dispatcher that the accident involves radioactive materials. Then, notify the RSO immediately.
- Notify the RSO immediately of any known or suspected overexposure of personnel.
- Properly display signage for radiation safety when operating the nuclear gauges.
- Instruct trained workers in the proper use of personnel monitoring equipment such as thermoluminescent dosimeters (TLD's) when appropriate, and confirm that they are

always worn when required in the posted areas of the SEPTA facility, or at temporary job sites when in the vicinity of operating SIEGMA units.

- Keep complete and accurate records of all radioactive sources in his/her possession.
- Assist the RSO in any surveys that are conducted as part of the SEPTA Radiation Safety Program.
- Assure that at least two Authorized Users (Gauge Operators) are present for operation of a SIEGMA detector (one to operate the unit while the other observes security of the restricted area and performs gamma and neutron measurements).
- Ensure that all problems related to radiation safety are identified and corrected in a timely manner or as soon as identified as the result of an authorized survey.

3.3 Training

All workers who use the portable nuclear gauges specified in the SEPTA license must receive three days of training according to the SSDR (CA 1259D101S). This training will consist of the two-day Basic Radiation Safety Course described above and an additional day of supervised hands-on training on the operation of SIEGMA devices. This training is intended to meet the training guidance in *Appendix D, NUREG 1556, Vol. 1, Rev. 1, Consolidated Guidance about Materials Licenses. Program-Specific Guidance about Portable Nuclear Gauges, November 2001*, as follows:

1.5 to 2 hours of radiation safety and regulatory requirements, emphasizing practical subjects important to safe use of nuclear gauges; radiation vs. contamination; internal vs. external exposure; concept of time, distance, and shielding to minimize exposure; control and surveillance of gauges; location of sealed source within the portable gauge; inventory; recordkeeping; incidents; licensing and inspection by regulatory agency; need for complete and accurate information; employee protection; deliberate misconduct.

1.5 to 2 hours of practical explanation of portable gauge theory and operation; operating, emergency, maintenance, and transportation procedures; and field training emphasizing radiation safety and including test runs of setting up and making measurements with the gauge, controlling and maintaining surveillance over the portable gauge, performing routine cleaning and lubrication, packaging and transporting the gauge, storing the gauge, and following emergency procedures.

Records of all training, including documentation of attendance are required to be maintained by the RSO for review by Nuclear Regulatory Commission inspectors.

The manufacturer's two-day BRS course and one-day hands-on training will be made available to all SEPTA personnel who plan to operate as 'trained' workers or Authorized Users. The training will consist of either conventional classroom training or may take advantage of appropriate computer-based training offerings. At a minimum, the BRS course will include a discussion of all radiological hazards that workers may encounter, including fires or other

incidents, and is intended to inform personnel about appropriate precautions and practices of ALARA.

Assessment of the successful conveyance of training information will be performed by a written examination and observation of individuals in the performance of licensed duties.

Successful completion of the two-day BRS course and one-day hands-on training leads to the trained worker classification. After this training, a request may also be made by the RSO to add this person to the license as an Authorized User.

In addition to the initial worker BRS training, the manufacturer will provide annual refresher radiation safety training. The refresher training will cover one or more aspects of the SEPTA radiation safety program or other appropriate issues as determined by the RSO. The intent is for the refresher training content to vary from year to year.

Qualifications of the Radiation Safety Trainer

Training materials will be prepared by a Certified Health Physicist (or equivalent career specialist in radiation safety) who is knowledgeable and has hands-on experience with the licensed materials in use by SEPTA and who is a specialist in radiation safety training. For example, training could be prepared and provided by Mr. Raymond Johnson, MS. PE. FHPS, CHP, Director of the Radiation Safety Academy (or other Certified Health Physicist faculty of the Academy). As a minimum the trainer must meet the qualification requirements of *Appendix D, NUREG 1556, Vol. 1, Rev. 1, Consolidated Guidance about Materials Licenses. Program-Specific Guidance about Portable Nuclear Gauges, November 2001*

3.4 Radioactive Materials License

A Radioactive Materials License has been issued to SEPTA by the Nuclear Regulatory Commission permitting the acquisition, possession, use, and handling of radioactive material. The license defines the types, quantity limits, application, and location of radioactive materials. Any change in the status of these radioactive materials requires prior approval by the RSO and possible modification of the NRC license. SEPTA, as the licensee, is responsible for meeting all requirements of the radioactive material license, including references such as the original license application and/or other correspondence with the Nuclear Regulatory Commission.

3.5 "As Low As Reasonably Achievable" (ALARA) Philosophy

The radiation safety program at SEPTA fully supports the concept that all radiation doses should be ALARA. Our ALARA program depends on the cooperation of all users of radioactive sources. The program includes the use of proper equipment, techniques, and procedures to lower radiation exposure. The RSO will perform an ALARA investigation of any whole-body dose equivalent in excess of 100 millirem (mrem) or shallow dose equivalent in excess of 500 mrem in any one month. Corrective actions stemming from these investigations may require a change

in training, policies, procedures, or an increased application of the principles of radiation protection (time, distance, and shielding).

Maintain ALARA exposures by practicing the basic principles of radiation protection.

The radioactive materials in SEPTA's nuclear gauges are such that only external radiation exposure is possible (gamma and neutron radiation while the nuclear gauges are in operation, and possibly gamma radiation from neutron activation products for a short time after the nuclear gauges have been operated). External radiation protection is attained through the application of the principles of time, distance, and shielding.

Minimize time of exposure – The less time you remain in a radiation field, the smaller the dose you receive.

Maximize the distance from the source – The dose rate for most radiation sources varies with the inverse square of the distance from the source. Therefore, the further you position yourself from the source of radiation, the smaller the dose you receive. For example, doubling the distance from a radiation point source will result in 1/4 the exposure in the same amount of time. Even a small increase in distance can result in a dramatic decrease in dose rate.

Shield the radiation source – Place shielding between yourself and a source of penetrating radiation to decrease your dose. For gamma rays emitted from activation products, lead is used when exposure rates are significant. For neutrons, concrete, bricks, and masonry are good for radiation protection.

4 Policies & Regulations

4.1 Radiation Safety Orientation

Trained radiation workers and listed Authorized Users of radioactive materials and equipment must be knowledgeable of regulations and safety procedures and are required to attend the two-day manufacturer's BRS and one-day hands-on courses. Ancillary personnel whose duties may require them to work in the vicinity of radioactive materials may receive Radiation Awareness Training (described above) to inform them of radiation hazards and receive basic instructions in radiation safety (risks, signs and symbols, emergency contacts, and procedures).

4.2 Regulatory Standards for Radiation Protection

Use of radioactive materials is regulated and licensed by the Nuclear Regulatory Commission (NRC). The license references Title 10 Part 20 of the Code of Federal Regulations and other regulations for the control of ionizing radiation. Additional requirements are included in the

license issued to SEPTA governing the possession and use of radioisotopes. Employees are required to abide by these standards and the current license.

4.3 Radiation Exposure Limits

The SEPTA Radiation Safety Program is designed to reduce all radiation exposures, above background level, to a level "As Low As Reasonably Achievable" (ALARA). The annual limits cited below have been established by the Nuclear Regulatory Commission for adult workers. Actual worker doses should be much lower than the regulatory limits.

Total Effective Dose Equivalent (Whole Body)	5 rem
Individual Organs, Deep Dose Equivalent	50 rem
Eye Dose Equivalent	15 rem
Skin or extremity	50 rem

Additional annual dose limits have been established as follows:

Embryo/fetus	0.5 rem (for the duration of declared pregnancy)
Public, Total Effective Dose	0.1 rem or no more than 0.002 rem in any 1 hour

4.4 Facilities

Radioactive materials may only be used as described in the license and in locations approved by the RSO. Personal protective equipment (PPE) is not required for the working on the SIEGMA 3E3 or 3E3 nuclear gauges. However, the nuclear gauges must be stored in secured areas and in a manner to minimize the risk of breakage, damage, or theft. All storage facilities must be posted with appropriate warnings and notices.

When necessary to operate the nuclear gauges at temporary job sites to investigate a suspicious bomb package, a restricted area of about 30 feet will be established around the neutron generator according to procedures described in the Operators Manual for the SIEGMA 3E3 and 3M3. Restricted areas will be defined by a roped perimeter or by visual observation and verbal warnings to anyone approaching an exclusion area of 30 feet from the neutron generators.

4.5 Signs, Labels, and Notices

Entrances into areas containing radioactive materials must be conspicuously posted as noted below and with an NRC Form 3 "Notice to Employees" so that they can be easily seen by persons entering or leaving a restricted area. All signs and labels required shall bear the conventional radiation symbol in magenta or purple on a yellow background. Signs and labels are available from the RSO. Posting will also include a "Notice of Availability" to show where the

Radioactive Materials License, Regulations, Radiation Safety Manual, and Emergency Operating Procedures may be found.

Areas / Facilities:

Unrestricted Area

An area with no limited access. No special signs or postings are needed for these areas.

Restricted Area

An area with access limited by the licensee for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive materials.

These are further explained below.

Radioactive Materials Area

An area not meeting one of the below definitions, but containing radioactive materials.

Special Posting Required

"CAUTION – RADIOACTIVE MATERIALS"

Radiation Area

An area accessible to individuals in which radiation levels could result in an individual receiving a dose equivalent in excess of 5 mrem (0.05 mSv) in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates.

Special Posting Required

"CAUTION – RADIATION AREA"

High Radiation Area

An area accessible to individuals in which radiation levels could result in an individual receiving a dose equivalent in excess of 100 mrem (1 mSv) in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates.

Special Posting Required

"CAUTION – HIGH RADIATION AREA"

Containers:**Storage
Container**

A temporary or permanent container used for storing radioactive materials

Special Posting Required

"CAUTION-RADIOACTIVE MATERIALS"
(Labels must also include isotope, activity and date)

Equipment:

Equipment Containing Sealed Sources For equipment containing sealed sources such as a tritium foil in a metal hydride.

Special Posting Required

"CAUTION-RADIOACTIVE MATERIALS"

Indiscriminate use of radiation signs and/or labels is prohibited. Such use conveys a false warning, which can breed disrespect for real hazards.

4.6 Inventory

The RSO will keep and maintain an up-to-date inventory of radioactive materials (nuclear gauges). A physical inventory will be conducted for all licensed radioactive sources at intervals not to exceed six months. The RSO will maintain records of these inventories for NRC inspection.

4.7 Personnel Monitoring

External dosimeters from a NVLAP accredited vendor will be provided to all persons who work with SIEGMA 3E3 and 3M3 devices (trained workers and Authorized Users). They will be exchanged on a quarterly basis.

4.8 Radiation Instruments and Calibration

Radiation survey meters and detection equipment shall be obtained, maintained, and calibrated annually and after all repairs.

SEPTA will employ two types of radiation dose rate instruments, a gamma exposure meter and a neutron exposure meter. Currently, for gamma exposure rates, SEPTA is using the "microRem" model manufactured by Thermo Electron Corporation.¹ This is a plastic scintillator with an energy independent response over a wide energy range. The neutron survey instrument in use is the "Meridian 5085" model manufactured by Far West Technologies.² This is a "rem ball" type instrument. Both of these types of instruments are used:

- 1) to verify the combined gamma and neutron exposure levels at the operator's location when the nuclear gauges are in operation
- 2) to determine the dose at the boundary of a restricted area when the bomb detectors are in use at temporary job sites, and
- 3) to determine the presence of neutron activation products after use of the bomb detectors.

One or more of each of these radiation detection instruments will be maintained for use at the Philadelphia address. One of each type of dose rate instruments will also be sent with the bomb detectors for use at off-site locations. SEPTA reserves the right to upgrade to other radiation detection instruments.

Current Inventory:

<u>Make and Model</u>	<u>Description</u>	<u># Available</u>	<u>Purpose</u>
Meridian Model 5085	Neutron Survey Meter	1	Exposure monitoring
Thermo Electron Corp. MicroRem	Plastic Scintillator	1	Exposure monitoring

4.9 Leak Tests

The nuclear gauges on the SEPTA license are exempt from leak test requirements.

4.10 Exposure Limits and ALARA

Users of materials and equipment are responsible for preventing exposures in excess of limits specified in the Nuclear Regulatory Commission Regulations. Additionally, use of materials and equipment shall be designed and used to keep exposures As Low As Reasonably Achievable

¹ The "microRem" model x-ray/gamma-ray tissue-equivalent survey monitor was formerly known as the Bicon-St. Gobain microRem (or microSievert) model. The Radiation Measurement division of Bicon-St. Gobain is now a part of Thermo Electron Corporation.

² More information and an operator's manual for the Meridian 5085 can be found at:
http://www.fwt.com/hpi/hpi_5085ds.htm

(ALARA). If an exposure above allowable limits is suspected it must be reported immediately to the RSO.

The RSO will investigate any quarterly exposures exceeding 100 mrem. Changes in training, practices, or policies may be made as appropriate for reducing quarterly exposures and maintaining ALARA.

4.11 Waste

No radioactive waste will be generated at SEPTA based on the current licensed activities. SIEGMA devices that are no longer usable will be returned to the manufacturer for disposal.

4.12 Accidents, Emergencies, Security

All accidents, emergencies, loss or theft involving radioactive materials and equipment must be reported immediately to the RSO.

4.13 Shipping

All licensed materials shipped from SEPTA facilities or by SEPTA personnel require the prior review and approval of the RSO and shall be in accordance with the Department of Transportation and other pertinent regulations.

5 Regulations

Copies of all relevant Federal regulations will be maintained by the RSO.

6 Radiation Monitoring

6.1 Surveys

The RSO or designee will perform quarterly dose rate monitoring consisting of integrated neutron and gamma doses recorded on area dosimeters (these will be the same TLDs issued to trained workers and Authorized Users). Area dosimeters will be placed in representative locations in or adjacent to the posted storage room. These data may be supplemented by collecting real-time dose rate measurements using suitable radiation survey instruments for

quantifying neutron and gamma ray dose rates, as appropriate. Area dosimeter survey data will be maintained by the RSO. Any instrument used to collect survey measurements must be calibrated at least annually. Certificates of calibration will be maintained by the RSO.

In addition to routine dose rate surveys, potentially contaminated areas must be surveyed:

- After any spill, leak, fire, or other disturbance in the facility that may affect the integrity of the sources in the nuclear gauges;
- Before maintenance or removal of any equipment that may have come in contact with radioactive material or that contains radioactive material.

Should contamination surveying be necessary, the RSO will arrange for contractor support from a licensed vendor with experience in contamination monitoring and decontamination.

6.2 Dosimetry

Dosimeters -- Personal monitoring devices (TLD dosimeters) are required for workers who handle radioactive material or who may receive 10 percent of the maximum dose of external radiation permissible under Nuclear Regulatory Commission regulations. The RSO will request the dosimetry records of new radiation workers from other institutions where they used radioactive materials for the current year in order to establish compliance with annual dose limits. Records of employee radiation exposure history shall be maintained by the RSO.

Dosimeters will be used for monitoring gamma and neutron exposure. As mentioned above, the RSO will use area radiation dosimeters to monitor levels of radiation in posted areas.

Employees must wear issued dosimeters while working with radioactive materials in posted areas. While not being worn, dosimeters should be stored away from all radiation sources in a "background" area. They are not to be taken home, although they should be taken to temporary job sites where the SIEGMA nuclear gauges are operated, installed, or serviced.

NOTE: Individuals issued radiation dosimeters will be provided with copies of their dose history annually; it is recommended that they be reviewed upon receipt.

Any dosimeter contaminated or exposed to excessive heat, moisture, or medical x-rays should be returned to the RSO for replacement. After any accident or if an overexposure is suspected, the dosimeters should be returned immediately to the RSO to be read. Dosimeters should be worn on a shirt, coat pocket, lapel, or in some other position between the waist and the shoulders that will be representative of any radiation exposure.

6.3 Bioassay

Given the terms and conditions of the license, it is not possible that workers will receive intakes of radioactive materials under normal conditions. Therefore, no routine bioassay program will be implemented. Should an incident warrant internal dose monitoring, the RSO will arrange for bioassay sample collection and analysis. Bioassays for tritium are obtained by urine samples.

7 Declared Pregnant Woman

It is recognized that the human embryo and fetus are more sensitive to radiation than are adults. Therefore, the dose limit to the embryo/fetus is set at 0.5 rem for the entire term of a woman who declares pregnancy in writing. An employee who is pregnant or thought to be pregnant has the option of identifying herself as a "Declared Pregnant Female." Declaration of this status invokes certain obligations on the part of the employer as listed below. However, the more rigorous dose limit is applicable only to women who declare pregnancy in writing. All pregnant employees may voluntarily choose to formally notify their supervisor or the RSO so that dose reduction steps can be taken; however, notification is strictly voluntary.

7.1 Declaration

Pregnant employees, if they so desire, should notify their supervisors in writing when they become pregnant or they intend to become pregnant. The notification should include the date of declaration, estimated date of conception, and expected date of birth.

7.2 Supervisor Responsibility

The supervisor, in a confidential manner, shall notify the RSO of all declarations and provide copies of all declarations.

7.3 RSO Responsibility

The RSO will meet with the declared pregnant female employee and, at a minimum, provide a copy of *Nuclear Regulatory Commission Regulatory Guide 8.13 'Instruction Concerning Prenatal Radiation Exposure.'* The RSO will investigate and document the nature of the employee's work and the potential radiation levels in the working area. The RSO will determine if personal monitoring is required and will implement monitoring if necessary. The RSO will determine what steps are necessary to maintain all doses to the embryo/fetus below allowable limits.

7.4 Exposure Limits

The maximum dose to an embryo/fetus during the entire pregnancy, due to occupational exposure of a declared pregnant woman, shall not exceed 0.5 rem. An employee who becomes pregnant is strongly encouraged to notify her supervisor and the RSO in writing as soon as possible. The RSO will inform the pregnant woman and her supervisor of individual actions that may need to be taken to ensure compliance with the 0.5 rem limit.

ALARA recommendations on pregnancy and radiation exposure include:

- Notifying supervisor immediately when pregnancy is known or suspected.
- Using appropriate shielding while performing work with certain radionuclides.
- Wearing radiation dosimeter at the waist.

8 Procuring Radioactive Materials

No radioactive sources may be ordered without the approval of the RSO or ARSO. This is to assure that license limits are not exceeded. Orders for nuclear gauges must not be placed with the vendor without written approval of the RSO or ARSO.

9 Receiving Radioactive Materials

Prior to moving out of the receiving area, all packages containing radioactive materials must be inspected for any evidence of damage. Package receipt and opening procedures may be implemented by the RSO, AU, or other trained worker. Once opened and surveyed, the package receipt form is signed and dated. After being recorded in the radioactive material logbook, packages will be delivered to the appropriate areas.

The following package opening procedure will be followed:

1. Wear gloves to prevent hand contamination
2. Visually inspect the package for any sign of damage (e.g. crushed, punctured). If damage is noted, stop and notify the RSO.
3. Check DOT White I, Yellow II, or Yellow III label or packing slip for activity of contents, to ensure that the shipment does not exceed the license possession limits.

4. Monitor the external surfaces of a labeled package.
5. Open the outer package and remove packing slip. Open inner package to verify contents (compare requisition, packing slip and label on the container). Check integrity of the final source container (e.g., inspecting for breakage of seals, discoloration of packaging material, etc.). Again check that the shipment does not exceed license possession limits. If anything unexpected is found, stop and notify the RSO.
6. Maintain records of receipt and package survey.
7. Notify the final carrier and notify the NRC if external radiation levels exceed the limits of 10 CFR 71.47.

If an opened package is found to have compromised contents, the RSO must be notified immediately for guidance. The package should be contained in a restricted area to minimize spread of contamination until it can be safely sealed and removed.

AUs must notify the RSO upon receipt of all licensed sources. Inventory records will be updated as appropriate. Shipping and transfer documents must be forwarded to the RSO where they will be maintained in the radiation safety files.

10 Transportation of Radioactive Materials

Transportation of radioactive materials must be in accordance with all applicable rules and regulations as promulgated by the U.S. Department of Transportation (DOT). Packages of licensed material that are to be offered for transportation can only be prepared by persons who have completed HAZMAT training requirements specified in **49 CFR 172 Subpart H**. If the licensed radioactive material will be transported by ground, the shipper must follow the DOT requirements for packaging. If the licensed radioactive material will be shipped by air, you should contact the carrier to determine if the package must be prepared in accordance with International Air Transport Association (IATA) requirements.

The neutron generator used in the SIEGMA™ nuclear gauge is classified as a Class 7 (Radioactive) Material. The neutron generator is categorized as a "radioactive instrument or article". When a neutron generator is being prepared for shipment, it must be placed in a package that meets the DOT's Class 7 package general design requirements (see 49 CFR 173.410). The package must be marked on the outside with the code "UN2911". The name and address of the shipper or recipient must be clearly marked on the outside of the package.

The following requirements apply:

- The dose rate at any point on the surface of the package must not exceed 0.5 mrem/hr.

- The dose rate at any point 10 cm from the unshielded generator must not exceed 10 mrem/hr,
- Removable radioactive contamination on the outside of the package may not exceed 22 dpm/cm² when averaged over at least 300 cm².

If shipped by air under IATA regulations, the following additional information must be marked on the outside of the package:

- the phrase "Radioactive Material, excepted package-Instruments or Articles",
- the name and address of both the shipper and recipient,
- permissible gross weight, if over 50 kg.

Be sure to keep records showing the transfer of radioactive materials to other organizations.

11 Storing Radioactive Materials

Any radioactive material in use must be attended at ALL TIMES, or secured by locking the room when vacated. Radioactive materials may not be left unsecured. Radioactive materials in storage, i.e. not being used, must be secured when the room in which it is stored is unoccupied. The required security may be accomplished by locking the room while unoccupied, or alternatively, by locking the radioactive materials within cabinets or locked boxes. Wherever possible, locked boxes are recommended for storage of radioactive materials. Only the RSO and AUs may have access to radioactive materials. Radioactive materials that are stored or used in areas common to both authorized and unauthorized personnel must be secured at all times from unauthorized personnel. It is strongly recommended that all areas containing radioactive materials be locked when unoccupied during daytime hours and at night.

12 Emergency Procedures

Notify the RSO as soon as possible of all radiation emergencies. The RSO or his/her designee will investigate all accidents, spills, fires, or other incidents in which radiological material is involved. In the event of an accident, the RSO or his/her designee will assist by providing technical advice and by monitoring personnel.

The RSO or his/her designee has the responsibility to plan and to arrange emergency medical care for victims contaminated with radioactive material or overexposed to radiation at the

SEPTA facility. The RSO or his/her designee will ensure that procedures for emergency care, a list of telephone numbers, and contacts are made available to all Authorized Users.

12.1 General Emergency Procedures

All users of radioactive materials should be familiar with these procedures before any emergency arises.

When an accident involving radioactive materials occurs, address the greatest hazard first. Lifesaving measures always take precedence over decontamination or other concerns. Advise personnel working nearby of any hazard or accident as soon as possible and prevent them entering the hazardous area. Notify RSO or his/her designee if an incident occurs.

If the neutron tube were to be broken due to shock or vibration, the tritium gas in the tube (operating tube) and/or the tritium adsorbed on the inner surfaces of the tube would escape into the accelerator head and be contained within the sealed accelerator head. No tritium would be released into the environment. The total amount of tritium released into the accelerator head would be about 1-2 milliCuries. None of the tritium contained in the ion source reservoir or the target will be released into the accelerator head. If the user suspects that the neutron tube has been broken, the accelerator head should immediately be sealed into a plastic bag. As a further precaution, the accelerator head could then be sealed into a container fabricated from PVC water pipe. These operations should be done under the supervision of the RSO. Contact the gauge manufacturer, HiEnergy Technologies, Inc. for further instructions. The accelerator head should not be opened under any conditions. So long as the sealed accelerator head remains intact, there will be no external release of tritium.

If the accelerator head seal is broken, and the accelerator head is subjected to very high temperatures, such as may exist in a fire, some or all of the tritium in the ion source and target could be released as a gas. The released tritium will be dispersed as a gas, or tritiated water vapor, into the environment.

12.2 Specific Emergency Procedures

Fire

1. If minor, immediately attempt to put out the fire by approved methods (i.e., fire extinguisher) if other fire hazards are not present.
2. Notify all persons present to vacate the area and have one individual immediately call the RSO and the fire department.
2. When calling 911, tell the dispatcher that radioactive materials are involved.
3. Once the fire is out, isolate the area to prevent the spread of possible contamination.

4. Decontaminate personnel by removing contaminated clothing and flushing contaminated skin with lukewarm water and washing with a mild soap.
5. In consultation with the RSO, determine a plan of decontamination for the affected area.
6. Do not continue work in the laboratory without RSO or his/her designee approval.

(Again, call 911 without delay for any serious injuries. Give as much information as possible regarding the nature of the accident and the injuries that are present. Do not hang up the phone until you are instructed to do so.)

Explosion

1. For any accident involving serious injuries, first call 911. Do not delay. Inform the dispatcher that the accident involves radioactive material.
2. Perform any lifesaving and first-aid measure that you can. There may be a significant amount of time before the Hazardous Material (HAZMAT) unit can get to the accident.
3. Call the RSO or his/her designee.
4. Turn off all fume hoods and ventilation where possible.
5. If possible, evacuate the area of the explosion. Restrict contamination to the area by removing your gloves, shoes, and laboratory coats before leaving.
6. Wash all contaminated areas of skin thoroughly, without vigorous scrubbing, with cool water and mild soap for five to ten minutes. Do this as soon as possible after the accident.
7. Flush any superficial wound thoroughly with cool water and cover with a sterile dressing.
8. Remember also to remove all clothing that may have been contaminated.
(Take care not to re-contaminate yourself.)
9. Do not leave the area until someone (RSO or his/her designee) has determined that you have been successfully decontaminated.

During Device Testing

For emergencies encountered during testing operations of a SIEGMA 3E3 or 3M3 device, implement the following procedure:

1. The generator can be deactivated remotely via computer running the generator control software. Disconnecting the serial communication line between the computer and the generator control unit also results in the de-activation of the generator. The generator can also be deactivated by disconnecting the 12 volt power supply.

2. In the event of an exposure rate in excess of 2 mR/h at or beyond the restricted area, the generator will be deactivated, and the safety perimeter will be widened. Exposure rate measurements will be acquired at the new perimeter to ensure safe operation of the generator.
3. In the event of damage or breakage of the neutron tube, the parts will be placed in a double plastic bag using gloves. Each bag will be sealed and placed in a sealed shipping container. After leak and surface contamination testing, the container must be returned to Thermo MF Physics (the tube manufacturer) for legal destruction. The area surrounding the incident will be surveyed to determine the amount (if any) of contamination resulting from the breakage.

12.3 Personal Contamination

Thorough, gentle washing with soap and water is the best general method. However, it is most important not to harm the integrity of the skin, as that can make the problem worse. Avoid overuse of detergents. In all cases avoid use of organic solvents as they may increase absorption through the skin. Contact the RSO for assistance.

12.4 Contaminated wounds

Skin lacerations should be washed by large volumes of cold water. If bleeding is not too severe, allow bleeding to further cleanse the wound. Notify RSO immediately and administer first aid.

12.5 Ingestion

Accidental ingestion should be treated by drinking any type of diuretic to flush the tritium from the body. Notify RSO immediately.

12.6 Inhalation

Inhalation should be treated by drinking any type of diuretic to help flush the tritium from the body. Notify RSO immediately.

12.7 High Radiation Exposure

In the event of an accident involving exposure to a high dose of radiation sufficient to produce radiation sickness symptoms, notify the RSO immediately. An appropriate medical facility will be utilized for treatment and care of victims exposed to high doses and/or internal contamination.

This is to acknowledge the receipt of your letter/application dated

11/21/2006, and to inform you that the initial processing which includes an administrative review has been performed.

☒ New License Application (63037374)
There were no administrative omissions. Your application was assigned to a technical reviewer. Please note that the technical review may identify additional omissions or require additional information.

☐ Please provide to this office within 30 days of your receipt of this card

A copy of your action has been forwarded to our License Fee & Accounts Receivable Branch, who will contact you separately if there is a fee issue involved.

Your action has been assigned **Mail Control Number** 139756.
When calling to inquire about this action, please refer to this control number.
You may call us on (610) 337-5398, or 337-5260.

BETWEEN: : (FOR LFMS USE)
: INFORMATION FROM LTS
: -----
:
License Fee Management Branch, ARM : Program Code: 03121
and : Status Code: 3
Regional Licensing Sections : Fee Category: _____
: Exp. Date: 0
: Fee Comments: _____
: Decom Fin Assur Req'd: _
:

LICENSE FEE TRANSMITTAL

A. REGION I

1. APPLICATION ATTACHED

Applicant/Licensee: SOUTHEAST. PA TRANS. AUTH. (SEPTA)
Received Date: 20061121
Docket No: 3037374
Control No.: 139756
License No.: 37-31206-01
Action Type: New Licensee

2. FEE ATTACHED

Amount: \$1,200.00
Check No.: 1876

3. COMMENTS

Signed *Reference found*
Date 11/29/2006

B. LICENSE FEE MANAGEMENT BRANCH (Check when milestone 03 is entered /_/)

1. Fee Category and Amount: _____

2. Correct Fee Paid. Application may be processed for:

Amendment _____
Renewal _____
License _____

3. OTHER _____

Signed _____
Date _____